

The application was originally made under the Patent Cooperation Treaty with the Japanese Patent Office acting as the receiving office on (86) 24 Nov 1982, being given an application number PCT/JP82/00447. The application was searched by the Japanese Patent Office acting as the International Search Authority (ISA), and published by the International Bureau on (87) 9 Jun 1983 under serial number WO 83/01932 in the Japanese language. The text of the application is contained in the publication made by the International Bureau as above identified, the accompanying text being an English translation thereof.

# (12) UK Patent Application (19) GB (11) 2 120 607 A

- (21) Application No 8318717
- (22) Date of filing 24 Nov 1982
- (30) Priority data
- (31) 56/175667
- (32) 25 Nov 1981
- (33) Japan (JP)
- (43) Date of issue  
7 Dec 1983

- (51) INT CL<sup>3</sup>  
(As given by ISA)  
B63B 35/02 35/44
- (52) Domestic classification  
B7A 123 139 40X CA

- (56) Documents cited by ISA  
JP, A, 2308743  
JP, B2, 56-47035  
JP, U, 52-110193

- (58) Field of search by ISA  
INT CL B63B 35/02,  
35/08-35/12, 25/28,  
35/44 Jitsuyo Shinan  
Koho 1929-1982 Kokai  
Jitsuyo Shinan Koho  
1972-1982

- (71) Applicant  
Hitachi Zosen Corporation  
(Japan),  
6-14 Edobori 1-chome,  
Nishi-ku, Osaka-shi,  
Osaka 550, Japan

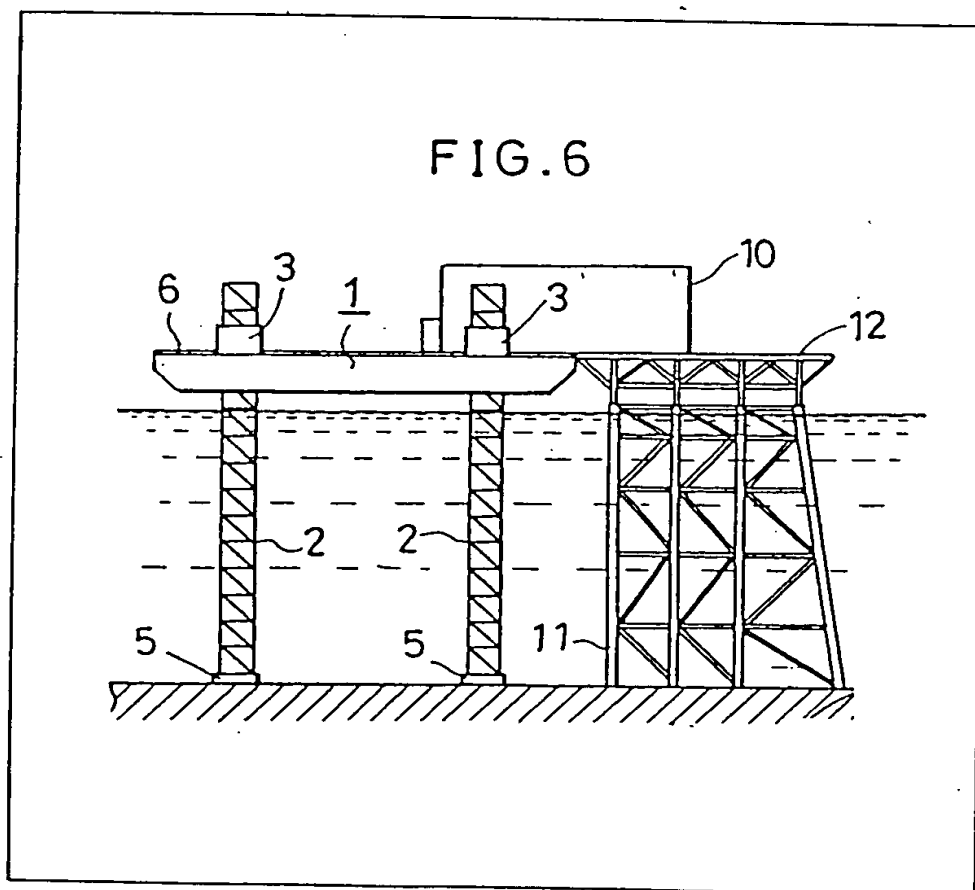
- (72) Inventors  
Terukazu Inoue,  
Masao Araki,  
Masaharu Yamamoto,  
Koji Misaki

- (74) Agent and/or Address for  
Service  
Swindell and Pearson,  
44 Friar Gate, Derby  
DE1 1DA

## (54) Work ship for installing large offshore structure

(57) Work ship used to install a large offshore structure such as a marine plant onto a foundation structure installed in the sea by transporting the offshore structure to the installation field. A plurality of elevationally movable support legs (2) and elevation devices (3) for elevationally

moving the legs (2) with respect to the hull (1) are provided along both sides of the hull (2) of the ship. The legs (2) are lowered onto the sea bed, and the hull (1) is raised up the legs (2) to the same height as the foundation structure, thereby enabling the easy moving and positioning of the offshore structure from the hull (1) onto the foundation structure without the use of a crane ship or the like.



GB 2 120 607 A



2120607

1/2

FIG. 1

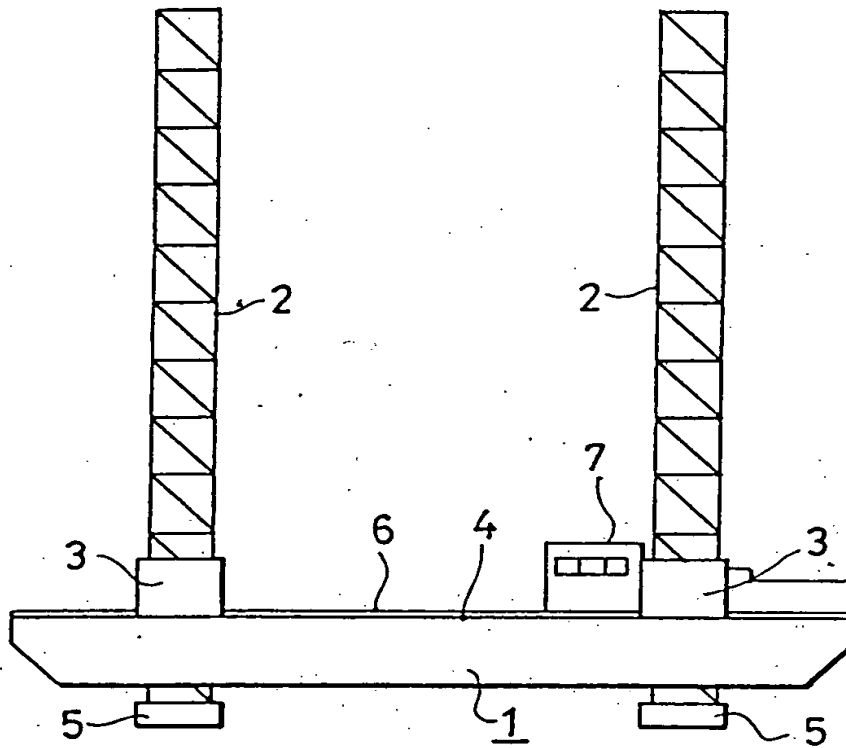


FIG. 2

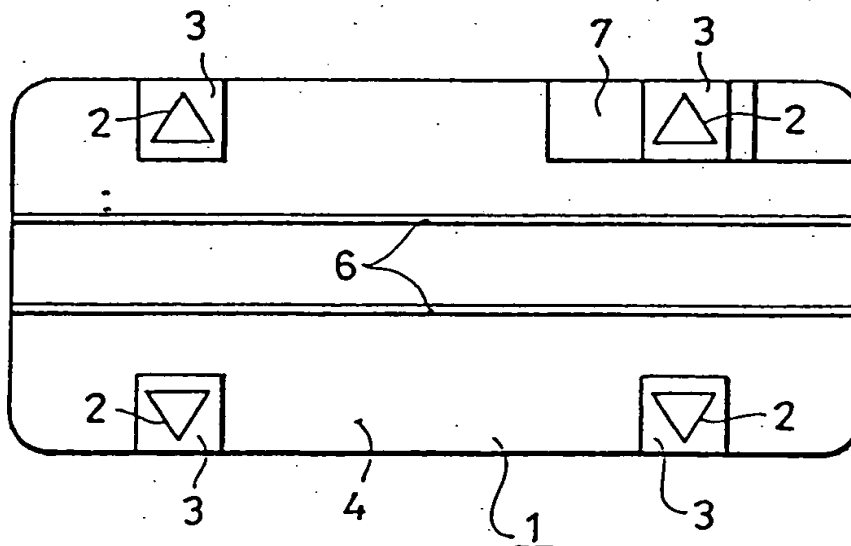




FIG. 3

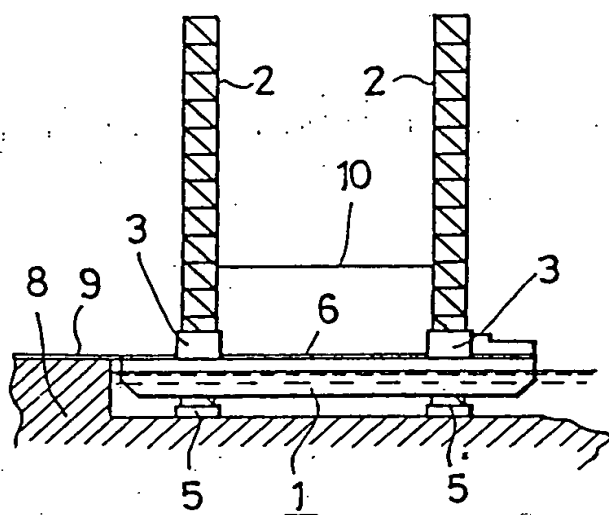


FIG. 5

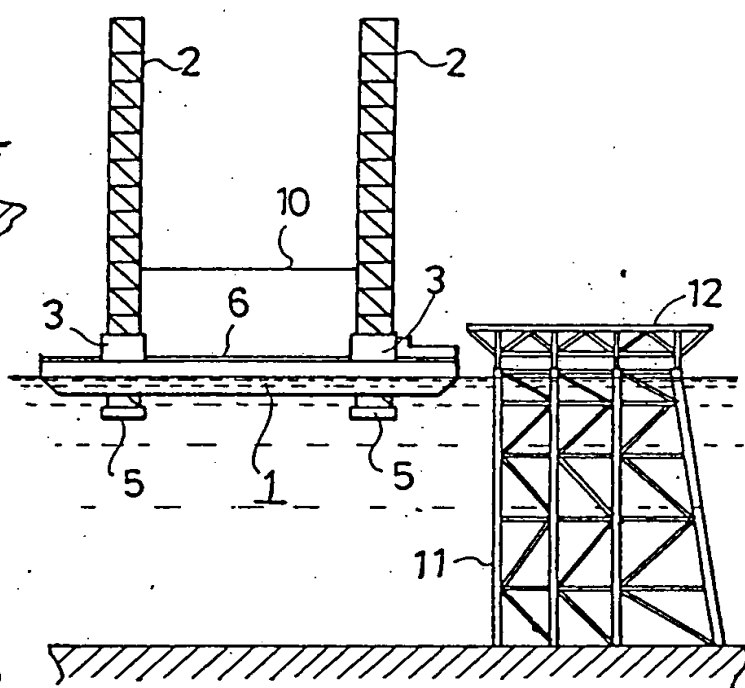


FIG. 4

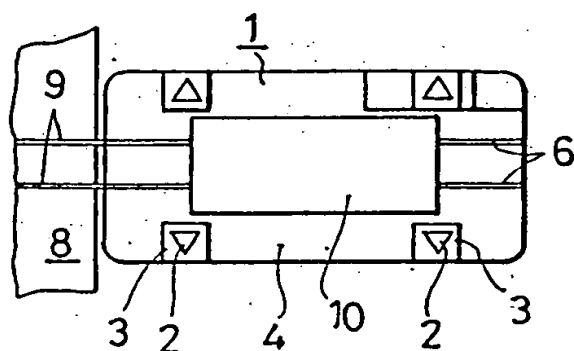
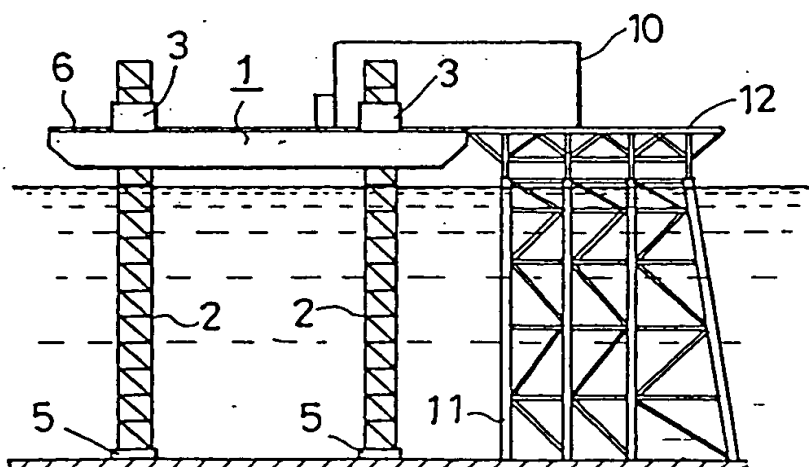


FIG. 6





## SPECIFICATION

### Working ship for installing large offshore structures

#### TECHNICAL FIELD

- 5 The present invention relates to a working ship for installing large offshore structures, and more particularly to a working ship for use in transporting a large-scale offshore structure, such as an offshore plant, to the site of installation and
- 10 installing the structure on a foundation structure which is built offshore.

#### BACKGROUND ART

- Offshore structures, such as equipment for submarine oil fields and offshore plants, to be
- 15 installed on offshore foundation structures are large-sized and heavy, so that it is impossible to build the structure in the form of an assembly and install the assembly in place with use of a crane ship or the like. Accordingly it has been
- 20 conventional practice to build such a structure in the form of divided blocks of relatively small sizes in accordance with the capacity of the crane ship, load these blocks onto a deck barge moored alongside the quay of the factory or brought into
- 25 the deck with use of an offshore crane or gate-shaped crane in the factory, transport the blocks to the site of installation, install the blocks on a foundation structure one after another with use of the crane ship which structure has already been
- 30 built, and thereafter connect the blocks together by piping, wiring, etc. This method therefore has the problem of involving large amounts of work for delivering the blocks from the factory, installing them at the offshore site and connecting the
- 35 installed blocks, being inefficient and consequently necessitating a prolonged period of construction and an increased cost.

- The object of the present invention is to provide a working ship which is adapted to easily transfer
- 40 a large-sized offshore structure built in the form of an assembly or large blocks thereof onto a foundation structure so that the large-sized offshore structure can be constructed and installed in place within a greatly shortened period
- 45 of time.

#### DISCLOSURE OF THE INVENTION

- The working ship of the present invention for installing large offshore structures comprises a plurality of support legs provided at opposite side
- 50 portions of the hull and movable upward and downward, and lifting means provided at the opposite side portions for moving the support legs upward and downward relative to the hull. Accordingly the large offshore structure, which is
- 55 built in the form of an assembly, or large blocks thereof can be loaded onto the hull and transported to the site of installation, where the hull is lifted along the support legs to the same level as a foundation structure, with the support
- 60 legs rested on the sea bottom in the vicinity of the foundation structure, so that the offshore structure or blocks thereof can be transferred from the hull

- onto the foundation structure easily without using any crane ship or the like. It is therefore possible to
- 65 build large offshore structures in the form of an assembly or as divided in blocks of larger sizes, consequently making it possible to construct larger portions in a factory under careful control. Thus offshore structure can be built with an
- 70 improved quality within a shortened period of time. Furthermore, the invention facilitates installation at the offshore site and reduces the amount of piping, wiring and the like connecting work to shorten the period of installation. As a
- 75 result, the invention, which assures a shortened period of construction, provides offshore structures at reduced costs. In addition, since the support legs are rested on the sea bottom to support the hull when the offshore structure is to be loaded or unloaded, the work can be carried out with safety and properly without permitting heaving of the hull.

- With the working ship of the present invention for installing large offshore structures, a skidway is
- 85 provided on the upper deck of the hull for transferring the offshore structure. The large offshore structure or large blocks thereof can therefore be loaded and unloaded with ease.

#### BRIEF DESCRIPTION OF THE DRAWINGS

- 90 Fig. 1 is a side elevation showing a working ship of the present invention for installing large offshore structures;
- Fig. 2 is a plan view of the same;
- Fig. 3 is a side elevation showing the working
- 95 ship loaded with a large offshore structure;
- Fig. 4 is a plan view of the same;
- Fig. 5 is a side elevation showing the working ship at rest in the vicinity of a foundation structure; and
- 100 Fig. 6 is a side elevation showing the offshore structure being transferred onto the foundation structure.

#### BEST MODE OF CARRYING OUT THE INVENTION

- The present invention will be described below
- 105 in greater detail with reference to the accompanying drawings.

- As shown in Fig. 1 and Fig. 2, a working ship for installing large offshore structures has a hull 1 which is provided at opposite side portions with a plurality of support legs 2 which are movable upward and downward and with lifting means 3 for the support legs. The lifting means 3, each provided for each of the support legs 2, are fixed to a horizontal upper deck 4 of the hull 1. The
- 110 support legs 2 extend vertically through the hull 1 and the lifting means 3. By the lifting means, the hull 1 and the support legs 2 are movable upward and downward relative to each other and can be locked to each other at the desired position. Each
- 115 of the support legs 2 is provided at its lower end with a spud member 5 so as to contact the sea bottom over an increased area.

- Provided on the upper deck 4 of the hull 1 are a skidway 6 for facilitating loading and unloading of
- 125 large-sized structures, a known transfer device

(not shown) of the hydraulic or winch wire type for moving the structure on the skidway 6, and a control room 7 for operating the lifting means 3, etc.

5 A large offshore structure constituting a plant, for example, will be installed in the following manner with use of the working ship described above (see Fig. 3 to Fig. 6).

10 First, the stern end of the working ship is brought alongside the quay 8 of the factory, the support legs 2 are rested on the sea bottom, and the level of the hull 1 is adjusted to position the skidway 6 on the working ship flush with a skidway 9 on the quay 8. The large offshore  
15 structure 10 built in the form of an assembly in the factory is then transferred from the skidway 9 on the quay 8 onto the skidway 6 on the working ship by the transfer device on the ship or by a transfer device on the quay 8 (see Fig. 3 and Fig. 4).

20 The offshore structure 10 transferred to a specified position is fastened to the hull 1 when so desired, the support legs 2 are released from the sea bottom and the working ship is then towed by a tugboat or the like to the site where the  
25 structure is to be installed.

A foundation structure (jacket) 12 for supporting the offshore structure 10 is rested on the sea bottom at the site. The foundation structure 11 has an upper end projecting above  
30 the sea level and carrying a cap truss 12.

After the working ship loaded with the offshore structure 10 has reached the site, the ship is stopped in the vicinity of the foundation structure 11, and the position of the ship is adjusted (see  
35 Fig. 5).

By the lifting means 3, the support legs 2 are

lowered into engagement with the sea bottom, and the hull 1 is then lifted along the support legs 2 and locked in the position where the skidway 6 is at the same level as the cap truss 12.

40 Subsequently a temporary skid is provided between the hull 1 and the cap truss 12. The offshore structure 10 is transferred from the hull 1 to the specified position on the cap truss 12 with use of the transfer device on the working ship (see Fig. 6). Finally the offshore structure 10 is secured to the cap truss 12 as by welding.

The structure of the hull 1, and the structure and number of the support legs 2 as well as of the  
50 lifting means 3 are not limited to those of the foregoing embodiment but can be varied suitably.

#### INDUSTRIAL APPLICATION

The working ship according to the present invention is suited to use in transporting a large  
55 offshore structure, such as an offshore plant, to the site of installation and installing the structure on a foundation structure which is built offshore.

#### CLAIMS

1. A working ship for installing large offshore  
60 structures comprising a plurality of support legs 2 provided at opposite side portions of the hull 1 and movable upward and downward, and lifting means 3 provided at the opposite side portions for moving the support legs 2 upward and downward relative to the hull 1.

2. A working ship for installing large offshore structures as defined in claim 1 wherein a skidway 6 is provided on the upper deck 4 of the hull 1 for transferring the large offshore structure.